

ticulars about the composition of the milk of a well-managed and well-fed herd of Shorthorn dairy cows. The herd, numbering twenty-two, was maintained for the purpose of supplying Rosslynlee Asylum with milk. The milk of each cow was weighed daily, and sampled weekly; the mixed milk of the herd was also sampled once a week. The investigation began in May, 1905, and lasted for a year. The cows were milked at 6.30 a.m. and at 4 p.m., and, as is always the case when the milking periods are unequal, the milk was found to be poorer after the longer than after the shorter interval. The morning milk averaged 3.15 per cent. of fat for the whole year, while the evening milk averaged 3.91 per cent. There was a marked difference in the milk of individual cows; one animal, for example, produced 655 gallons of milk during the year, containing 3.58 per cent. fat in the morning and 4.81 per cent. fat in the evening, while another produced 638 gallons, which contained only 2.96 per cent. fat in the morning and 3.5 per cent. fat in the evening. Until the middle of January the mixed milk of the herd always contained more than 3 per cent. of fat, but in spite of good management the quality then began to fall, and during the next three months the mixed milk contained less than 3 per cent. of fat eight times in the morning and four times in the evening; as the milk was sampled only once a week, it must, therefore, have usually contained less than 3 per cent. of fat in the mornings in February, March, and April. Although the cows were liberally fed, additional rations were tried for the purpose of improving the quality of the milk, and four animals were given 2 lb. linseed cake and 2 lb. oats per head per day. In accordance with experience, it was found that the addition of concentrated foods to rations, already liberal, produced no improvement in the milk.

West of Scotland Agricultural College Reports an Experiments, 1906.—The seventh and eighth annual reports of the West of Scotland Agricultural College have been issued as a single volume. This volume contains reprints of four bulletins which have already been issued separately. Among the subjects dealt with are the uses of inoculating materials for leguminous crops. Several crops were treated, but the only positive results were obtained with lucerne. At two centres it was found that lucerne was much benefited by treatment with Hiltner's inoculating material. In the first case lucerne was sown on April 12 on land which had probably never grown this crop, and had certainly not done so for twenty-eight years. Part of the seed was treated and part untreated. Early in July the crop growing from treated seed began to show signs of improvement, and in August, when flowering, it stood 20 inches to 21 inches high, while the adjacent untreated crop was but 13 inches to 14 inches. It was noticed that the inoculating material only did good on land which was well supplied with phosphates and potash; on soil deficient in either of these, inoculation produced no effect. At the second centre lucerne had been growing for a year before it was treated, and it was noticed that a few nodules had developed on the roots, but the crop was far from vigorous. On May 28 some sand was inoculated, and this was sprinkled over part of the lucerne. On July 15 the lucerne was cut; the treated plot then yielded 56 cwt. and the untreated plot 54 cwt. per acre, so that inoculation had not been effective. Directly after mowing, however, an improvement in the treated crop was noticed, and this improvement became more marked as time went on, so that when a second cutting was made on September 25 the land which had been treated with Hiltner's culture produced 74 cwt. per acre, as against 30 cwt. from the untreated soil. These experiments were made in 1905, when, at the instance of the Board of Agriculture, similar experiments were made in all parts of the country; and the West of Scotland tests illustrate the general result, which was that inoculating material proved useful for a leguminous crop newly introduced into a district, but was seldom beneficial in the case of crops commonly cultivated. The nodule organisms of these are abundant in most soils. Several of the experiments recorded in this volume deal with the best time of year at which to apply manures. In the case of turnips, the conclusion is stated that superphosphate, basic

slag, kainit, and muriate of potash are better applied in spring than in autumn; for hay, on the other hand, it is better to apply potash manures in autumn than in spring. For both turnips and potatoes it was found to be more profitable to apply farmyard manure in spring than in autumn.

ANTIPODEAN BIRD-LIFE.¹

IN an illustrated pamphlet bearing the date 1903, and published at the Government Press, Wellington, Mr. R. Henry, who has for many years acted as caretaker of the bird-reserve on Resolution Island, furnishes a fund of interesting information with regard to the habits and life-history of the flightless birds of New Zealand, with notes relating to other species. As he himself remarks, if anybody ought to know what there is to be known about New Zealand birds it is the author, who has, *willy-nilly*, enjoyed exceptional opportunities of observing them. As might have been surmised, a large amount of space is devoted to the birds commonly known in this country as kiwis (*Apteryx*). It appears, however, according to the author, that this usage is not justified, the name kiwi belonging by right only to the grey species and its immediate relatives, while such species as *A. australis* and *A. oweni* are designated "roa" by the Maori. Very interesting are the author's observations with regard to the breeding habits of these birds, among which the cock assumes the office of incubation. As regards kiwis, it is stated that although they live in nearly the same situations as rowas, they prefer open ground, while the latter seek the densest shade of the forest. "Kiwis generally have white grubs in their stomachs, with things like big maggots, wire-worms, and all that class, while the roas depend more upon earthworms, water-insects, and berries." When a roa becomes conscious of the presence of intruders it alters its usual stealthy gait to a loud tramp. Is this, it may be asked, defiance?

A very strange statement is made about the kakapo, or ground-parrot, namely, that it breeds only once in two years. This, however, is not all, for it is stated that, in place of some individuals nesting in one year and others in the succeeding season, the whole of the birds will breed in one particular year, while in the following year none will do so.

Continuing his remarks on the habits of the kakapo, the author observes that, "months before the appointed breeding season the male is developing an air-sac in his throat which he can puff up like a drum, and which may act like a sounding-board to assist in making the curious drumming notes in the spring. This note is not unlike the boom of the bittern, but is repeated five or six times in succession, and can be heard at a great distance. . . . It appears as if the breeding season were controlled by the males, for when there is no drumming in the early summer, there are no eggs or young ones."

Another bird about which the author has a good deal to say is the weka rail, or wood-hen, and it cannot be said that he gives it a good character, mainly on account of its egg-stealing habits. One of these birds, although it had never previously seen a goose in its life, seemed to know by instinct that the eggs of the latter would be buried in the ground, and promptly proceeded to disinter them. Apart from moas and the nearly extinct *Notornis*, penguins are the last of the flightless birds to claim the attention of the author. He has, however, much to say regarding such species as black swans, paradise-ducks, grebes, moreporks, &c., and in the case of all these the ornithologist should find much to interest him in this little volume, which is certainly a storehouse of information with regard to the habits of New Zealand's birds. It may be hoped that the Government will not only see its way to maintain Resolution Island as a bird-sanctuary, but that it may establish other stations of the same nature.

¹ "The Habits of the Flightless Birds of New Zealand; with Notes on other New Zealand Birds." By R. Henry. Pp. 88; illustrated. (Wellington, 1903.)

"Glimpses of Australian Bird Life." Thirty-one original photographs direct from Nature, with Notes by R. Hall. Pp. 63. (Melbourne: T. C. Lothian, 1906.) Price 1s.

"Glimpses of Australian Bird-life" is a praiseworthy attempt to encourage the study of the avifauna of the island-continent among field naturalists. The photographs, although on a small scale, are for the most part excellent, while Mr. Robert Hall's brief explanatory notes are (as might be expected) very much to the point. One of the most interesting species depicted is the whip-bird (or coachwhip-bird), while from the point of view of excellence in technique, special mention may be made of the portrait of the so-called reed-warbler and its nest. R. L.

NOTES ON RECENT PETROGRAPHY.

STUDENTS of the processes of sedimentation and of flocculation in clays should not overlook the three papers on sands and sediments, by Messrs. Mellard Reade and Philip Holland, that have been published in the Proceedings of the Liverpool Geological Society. The original analyses of sediments given in the second paper (vol. x., part i., 1905), and in the third now issued (1906), are distinctly valuable. Some of the specific gravities stated for clays seem a little high; but it must be admitted that we possess as yet far too little knowledge of our commonest sedimentary deposits. In vol. x., part ii. (1906), p. 136, the authors point out that "the experiments have, we think, demonstrated the existence of a mass of matter of unsuspected granular minuteness distributed throughout the sedimentary rocks of the earth. . . . We have strong grounds for thinking that the distribution of the finest sediment, in the form of what we may call quartz-dust, is oceanic." The abundance of quartz grains in some rocks popularly classed as argillaceous, such as "slates of coarse texture" (p. 156), is of course already familiar to agricultural investigators.

Mr. H. W. Nichols, in describing new forms of concretions (Field Columbian Museum Publications, Geological Series, vol. iii., No. 3, 1906), usefully brings to the front Forchammer's determinations of magnesia in the skeletons or shells of marine organisms, which were originally published in 1849. Mr. Nichols supports these by analyses of his own (pp. 48-9), *Corallium rubrum* giving him 9.32 per cent. of magnesium carbonate. Forchammer's Mediterranean *Serpula* yielded as high a figure as 7.64 per cent. The *Zoantharia* examined give only from 0.35 per cent. to 0.54 per cent.

Messrs. Allen, Wright, and Clement have experimentally investigated the minerals of the composition $MgSiO_3$ (*American Journal of Science*, vol. xxii., November, 1906), and have produced artificially the two pyroxenic types, monoclinic and rhombic, and the corresponding two amphibolic types. At atmospheric pressure (p. 415), the monoclinic pyroxene, $MgSiO_3$, a rare form in nature, is found to be the product of crystallisation from solvents; the material used for this experiment may be any of the forms of crystalline $MgSiO_3$. All the other forms of magnesium silicate (p. 437) pass into the monoclinic pyroxenic form at temperatures between 1150° and 1300° , depending on the crystal-form employed. Enstatite crystallises at lower temperatures than the monoclinic pyroxene. The amphibolic types have been produced by a rapid cooling, which, as the authors point out, is not likely to be the prevailing cause of their occurrence in natural rocks.

Mr. H. I. Jensen, in dealing with the volcanic area of the East Moreton and Wide Bay districts, Queensland (Proc. Linnean Soc. of New South Wales, 1906, p. 73), describes a number of trachytes containing riebeckite, some of which form important plugs or domes. Trachytes, as well as basalts, are recorded from Gough Island, in the South Atlantic, by Messrs. Pirie and R. Campbell (Proc. Royal Physical Soc. of Edinburgh, vol. xvi., 1906, p. 258). Mr. I. G. Sundell (*Bull. Comm. géol. de Finlande*, No. 16, 1905), writing in English, or American, affirms the importance of cancrinite as "a very abundant and doubtless primary constituent" of the syenites of the parish of Kuolajärvi in N. Finland. His paper, like many others from various parts of the world, shows the strong influence already exerted by the Chicago system of classifying igneous rocks.

Mr. G. K. Gilbert (*Bull. Geol. Soc. America*, vol. xvii., 1906, p. 321) discusses gravitational assemblage in

granite, citing striking cases from the Sierra Nevada, where large crystals of feldspar and hornblende have respectively assembled in aggregates in granite. An example of banded granite, where bands rich in hornblende and mica alternate with others rich in feldspar and quartz, suggests to the author successive sedimentation. Unconformities occur in the banding (p. 324), a dark band always forming the base of the upper series, and truncating obliquely the edges of previous bands. Mr. Gilbert puts forward the view, as a hypothesis, that a pair of bands represents a unit of deposition from the original magma, gravitation playing a rôle in the process.

Mr. R. A. Daly, of Ottawa, whose work in the field of igneous absorption and intermingling is well known, states his case of the Moyie Sill in the Purcell Range with effective lucidity in the *Festschrift zum siebenzigsten Geburtstag von Harry Rosenbusch* (Stuttgart, Schweizerbartsche Verlagsbuchhandlung, 1906). His contribution is entitled "The Differentiation of a Secondary Magma through Gravitative Adjustment," and his argument for the assimilation of a felspathic quartzite-series by a gabbro-magma is supported by a number of chemical analyses. A granite zone intervenes between the gabbro and the overlying part of the quartzite-series, and the author holds that (p. 225) "there is clear chemical proof that the greater proportion of the elements in the granite could have been derived directly by fusion of the quartzite." The gabbro, in its onward passage, absorbed beds of quartzite, but (p. 228) "simultaneously gravitative adjustment has nearly restored the original composition, as the acid, assimilated material rose through the denser gabbro magma to the top of the sill." We need not subscribe as yet to Mr. Daly's view (p. 233 and previous papers) that the pure igneous magma in the earth's crust is of basic composition, since there may be a variety of pure magmas in a variety of localities; yet we believe that there is much soundness in his concluding sentence:—"The fact of 'consanguinity' among the igneous rocks of a petrographical province may be due as much to assimilation as to differentiation." G. A. J. C.

ARCHÆOLOGY IN ITALY.

THE final rejection by the Italian Government of Prof. Waldstein's well-advertised project for an international excavation of Herculaneum gives the Rome correspondent of the *Times* food for reflection with regard to the alleged Chauvinism of Italian archaeologists, who will allow no foreigner to take part in Italian excavations, notwithstanding the fact, which they admit freely enough, that Græco-Roman antiquity is the property of the whole world, and not of Italy alone. While admitting that the postponement of the excavation of Herculaneum until such time as Italy can do it by herself does not much matter from the scientific standpoint, since "the treasures which lie beneath Resina are in safe keeping, and might remain undisturbed for centuries," the correspondent remarks that this is by no means the case with regard to other sites, which cry aloud for speedy excavation, for valuable evidence is in their case being destroyed daily by the "march of modern improvement." To do the work, Italy can muster neither sufficient money nor sufficient men, especially the latter. Yet she will not invite foreign aid, which would willingly and gratefully be given by archaeological students all over the world. As the *Times* correspondent is obliged regretfully to admit, "The foreigner is at liberty to pay his *lira* for admission to museums and other places; he may even give a round sum for the completion of some work in which he is interested, as long as he does not wish to help in carrying it out himself; he may turn his talents to such use as advertising the achievements of Italian archaeologists or translating their books into another language; he may show an intelligent and devoted interest, but it must be from a discreet distance. That, at least, seems to be the moral of all the recent relations between Italy and other countries in the archaeological questions which have come to the front during the last twenty years or so. One would willingly believe it otherwise; one would gladly put a more literal and liberal interpretation on their professions of confraternity; but how is it possible